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ABSTRACT

A study sought to determine whether differences in drawing performance, creativity, and the related skills of visual discrimination, fine muscle coordination, and spatial ability exist between second-generation Chinese-American and Caucasian-American young children. It also sought to determine which parental beliefs and practices are associated with the performance difference, if one exists. A total of 40 Chinese-American preschoolers and kindergartners and 40 Caucasian-American preschoolers and kindergartners were given the Test of Early Mathematics Ability-2 and the Draw-A-Person Test, along with visual discrimination, spatial relations and name writing tasks. Parents were interviewed and given a questionnaire on demographic information and educational attitudes. The results indicated that Chinese-American young children were more advanced in their drawing and handwriting than were Caucasian-American children. It was also found that Chinese-American parents set aside more time each day for the child to focus on fine muscle activities than did Caucasian-American parents. (MDM)

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A Cross-Cultural Study of Young Children's Performance on Drawing and Handwriting Tasks

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A Cross-Cultural Study of Young Children's Performance on Drawing and Writing Tasks

Parents and teachers in China and the United States have different views about appropriate instruction during the early childhood years (Gardner, 1989). In China the cultivation of basic skills is primary. It is believed that creativity will emerge later after children have been taught essential skills. The dominant view in the United States is that creative expression is best developed through a nondirective, progressive educational approach. It is believed that directive teaching in early childhood will squelch creativity and that skills are more appropriately developed at a later time (Gardner, 1989).

Winner (1989), Gardner (1989), and Cox (1992) have noted the differences in the quality of drawing skills that exist between Chinese and American children. Chinese children display exceptional ability to master adult ways of drawing and painting in their small, neat pictures. In the United States, young children are more likely to display large, messy drawings and paintings. The superior drawing performance of the Chinese children is attributed to the explicit art instruction in the Chinese schools and the early inculcation of compliance in children by their families (Winner, 1989). In the United States the emphasis is on creativity, imagination, and self-expression, rather than on correct ways of drawing. In fact, American early childhood teachers have been admonished not to show the child how to draw (e.g., Brewer, 1992; Read, Gardner, & Mahler, 1993). Read et al. (1993) recommend, "We do not give the child directions or set any kind of pattern....It is important that the child is free to express himself without the interference from adults" (p. 329).

Do children of first-generation Chinese-American parents show similar precocity in drawing when compared with Caucasian-American children where both groups are exposed to programs which offer non-directive early childhood art experiences? On the other hand, are Caucasian-American children more creative in their drawings?

Our first purpose in this study was to determine whether differences in drawing performance, creativity, and the related skills of visual discrimination, fine muscle coordination, and spatial ability exist between second-generation Chinese-America[illegible]d Caucasian-American young children. Our second purpose was to determine which parental beliefs and practices are associated with the performance difference, if one exists. If both groups of children have been exposed to similar preschool and kindergarten experiences, then any differences between groups could be attributed to cultural and family factors.

We predicted that Chinese-American children would be more skilled in drawing, numeral formation, name writing, visual discrimination, and puzzle solution. On the other hand, we predicted that Caucasian-American children's drawings would be more creative, given the emphasis on creativity in the United States. We also expected girls to be more skilled at drawing than boys.

We predicted that Chinese-American parents would hold more positive attitudes toward art than Caucasian-American parents, and that mothers would have more positive attitudes than fathers. Finally we expected that sex of child, parents' attitudes, parents' child-specific attitudes, and parents' practices would predict drawing, drawing creativity, motor coordination, puzzle solution time, and visual discrimination scores.

Method

Sample

40 second-generation Chinese-American children (10 preschool girls, 10 preschool boys, 10 kindergarten girls, and 10 kindergarten boys) and 40 Caucasian-American children (10 preschool boys, 10 preschool girls, 10 kindergarten boys, and 10 kindergarten girls) were recruited from schools in the suburban Chicago area. The Chinese-American sample had a mean age of 5.7 years and had attended preschool programs 22.2 months on average. (See Table 1.) Ten children had attended day care programs full time. Eleven were first-borns, 7 were middle children, 19 were last-born, and 3 were only children. There were 2.2 children per family. Mothers, on average, were 37.4 years old and had an educational attainment level of 16.7 years. Fathers were, on average, 39.8 years old and had an educational attainment level of 18.2 years. Twenty-eight families had incomes over $60,000. Countries of origin included Taiwan (31 families), mainland China (4 families), Hong Kong (4 families), and the Philippines (1 family). Thirty-nine families spoke a Chinese dialect in their homes. Sixteen were Buddhist, 16 were Christian, and 8 were non-religious. Eight of the families had grandmothers living in their homes; two had Chinese nannies living with them.

Insert Table 1 about here

The mean age of the Caucasian-American sample was 5.6 years. They had attended preschool programs for an average of 21.4 months. Six children had attended day care programs full time. Eighteen were first-born, 7 were middle

children, 12 were last-born, and 3 were only children. There were 2.4 children per family. Mothers on average were 36.9 years old and had an educational attainment level of 17.2 years. The mean age of fathers was 39.6 and their mean educational attainment level was 17.7 years. Thirty-four families had incomes over $60,000. All parents except two fathers were born in the United States; one father was born in Canada and one in Austria. English was spoken in all homes. The majority of the families (36) were Christian. None of the families had grandparents living in the home. No significant between-group differences were found for parents' ages, parents' educational attainment levels, Hollingshead 4-factor status scores, age of the child, number of children in the family, or preschool experience.

Measures

Test of Early Mathematics Ability-2. The TEMA-2, a standardized test developed by Ginsburg and Baroody (1990), was used to assess both informal (35 items) and formal (30 items) mathematical thinking in young children. Items from the TEMA-2 that required the child to write numerals were the only ones utilized in this paper.

Draw-A-Person Test. The Draw-A-Person test, developed by Goodenough (1926) and revised by Harris (1963), focuses on 71 details of the drawn human figure. Children were asked to "Draw a picture of a person. Make the very best picture that you can." Test-retest reliability of the test has been reported as reasonably high (rs = .90 to.94) (Cox, 1993). Interrater reliability correlations among scorers ranged from .80 to .96. The score was used as an index of children's drawing skill in this study, not as a measure of intellectual and conceptual maturity. The drawings were also rated on creativity.

Name Writing. The child was asked to write her/his name on the back of her/his drawing using pencil. All children wrote their English names.

Visual Discrimination. The perceptual speed test (1st grade) from the Michigan Cognitive Battery (Stevenson et al., 1990) was used to assess the accuracy of children's ability to visually match one of four alternative pictures to the target picture. The test was not timed. The examiner pointed to each target picture and said, "Here is a picture of a _____. Point to the picture in this row that is exactly like the one in the box." The examiner then circled the child's answer. Older children were allowed to circle the answers by themselves if they wished. The test consists of three practice items and 18 scored items.

Spatial Relations. A wooden puzzle with inlays of three circles, three squares, and three hexagons, each divided into two pieces was given to assess the child's ability to see rotations in space. The puzzle frame is natural wood and the two halves of each geometric shape are different primary colors and are colored on both sides. Color is not a cue in fitting the two halves of the shape together. The inside cut of each of the three like shapes is different, i.e., one circle has a straight cut separating the two halves; one circle has a zigzag cut; and one circle has a curving cut. The solution time required and the strategies the child uses to solve the puzzle were recorded. The completed puzzle was shown to the child for 10 seconds. Then the researcher disassembled it, put all the pieces to the child's right in random order, and placed the puzzle frame in front of the child with the circles at the top.

Parent Questionnaires. Mothers and fathers independently completed questionnaires surveying parents' education, employment, age, religion,

household composition, country of origin, attitudes toward academic subjects and extracurricular activities, beliefs regarding education and child-rearing, child's preschool experience, expectations for their child, and personality characteristics that they view as important to encourage in their child. Responses to all questions below were made on 5-point Likert scales. Questions used in this research were as follows: (1) Indicate how easy or how difficult it was for you to achieve good grades in each of the following subjects [art, computers, foreign languages, physical education, literature, mathematics, music, science, social science, writing] (1 = very difficult, 5 = very easy); (2) How would you rate your competence in each of the following areas? [Same subject areas as #1] (1 = low competence, 5 = high competence); (3) How much did you like the following school subjects? [Same subject areas as #1] (1 = strong dislike, 5 = strong like); (4) How important do you think it is for your child to develop competence in each area listed below? [music, science, language arts, social studies, foreign language, computers, mathematics, art, sports] (1 = unimportant, 5 = very important); (5) How much does your child like to do each of the following? [make-believe play, puzzles, climbing, running jumping] (1 = not at all, 5 = very strong like); (6) How easy or difficult do you think it will be for your child to get good grades in each of the following subjects? [Same subject areas as #1] (1 = very difficult, 5 = very easy); 7) How important do you think it is to encourage the following personality traits in your child? [self-confidence, persistence, curiosity, obedience, sociability, politeness, creativity, calmness, assertiveness, neatness, concentration, independence, precision, respect] (1 = not important, 5 = very important);

Parent Interviews. Mothers and fathers were interviewed together in their homes regarding child-rearing practices, their role in facilitating academic development, discipline, and time allocation in their child's typical weekday. The variables taken from the interview are as follows: a) The amount of time the child spent on homework or practice per day, b) the amount of time the child spent viewing television per day, and c) the percentage of play parents preferred in a preschool curriculum.

Procedure

Children were tested individually in a comfortable setting in their day care center or in their home. They were given the TEMA-2, Draw-A-Person Test, the name writing task, the visual discrimination task, and the puzzle, in that order. This provided a nice variety of tasks and kept their interest. A graduate art student who was blind to the ethnicity of the children and to the hypotheses of the study scored the drawings, using Harris-Goodenough scoring. Separate blind raters (two experienced early childhood educators) rated the drawings for creativity on a 5-point Likert scale, with 1 representing "least creative" and 5 representing "most creative." Creativity was defined as the addition of unusual or unique elements to the drawing.

The same set of early childhood educators rated on a 5-point Likert scale the maturity of the numerals written by the children during the course of taking the TEMA-2. The least mature numerals were rated 1 and the most mature numerals were rated 5. Another set of experienced early childhood educators independently rated the children's handwriting of their first names. The following criteria were used in rating the maturity of the numerals and names: proper

formation of letters/numerals, uniformity of spacing, alignment in a plane, size of letters/numerals, and line quality. Interrater reliability between the two independent raters for each of the three measures was high (r = .88). The scores of the two raters in each case were averaged together.

Results

Children's Outcomes

A 2 (ethnicity) x 2 (sex of child) x 2 (age) MANOVA performed on the Draw-A-Person and visual discrimination raw scores; the drawing creativity, name writing, and numeral writing ratings; and puzzle solution time yielded main effects for ethnicity, F (5, 68) = 15.45, $p < .0001$, and age, F (5, 68) = 19.50, $p <$ .0001. Univariate results indicated that the drawings of Chinese-American children were rated as significantly more mature (M = 22.85) and more creative (M = 3.38) than those of Caucasian-American children (Ms = 16.67, 2.43), Fs (1, 72) = 17.78, 15.44, ps < .0001. (See Figures 1 & 2.) Chinese-American children's name-writing (M = 3.55) and numeral formation (M = 3.63) were rated as significantly more mature than those of their Caucasian-American counterparts (Ms = 2.66, 2.00), Fs (1,72) = 24.81, 70.74, ps < .0001. Chinese-American children (M = 4.09 minutes) also solved the puzzle more quickly than Caucasian-American children (M = 6.47 minutes), F (1, 72) = 8.52, $p < 01$.

Insert Figures 1 & 2 about here

Visual discrimination scores of Chinese-American children (M = 16.42) also surpassed Caucasian-American children (M = 15.45), F (1.72) = 5.85, $p <$

.05. An Ethnicity x Age interaction, F (1, 72) = 7.11, $p < .01$, indicated that Chinese-American children were ahead only at the preschool level: Chinese preschoolers, 15.90; Caucasian preschoolers, 13.85; Chinese kindergarteners, 16.95; Caucasian kindergarteners, 17.05.

As expected, on measures of drawing (M = 22.75), name-writing (M = 3.75), numeral writing (M = 3.48), and visual discrimination (M = 16.98) kindergarteners scored significantly higher than preschoolers (Ms = 16.78, 2.46, 2.15, and 14.88, respectively), Fs (1, 72) = 16.64, 52.20, 47.03, 27.78, ps < .0001. Kindergarteners (M = 3.89 minutes) solved the puzzle more quickly than preschoolers (M = 6.57 minutes), F (1, 72) = 8.43, $p < .01$. A Sex of Child x Age interaction, F (1, 72) = 8.10, $p < .01$, on the numeral formation ratings revealed that the numerals of preschool girls (M = 1.98) were rated significantly less mature than those of preschool boys (2.33), but the numerals of kindergarten girls (M = 3.85) were rated as more mature than those of kindergarten boys (M = 3.01).

One significant univariate sex of child difference resulted. Girls' drawings (M = 21.55) were significantly more mature than those of boys (M = 17.97), F (1, 72) = 5.96, $p < .05$.

Parental Measures

Mothers' and fathers' attitudes. A 2 (ethnicity) x 2 (gender of parent) MANOVA performed on parents' attitudes toward art revealed significant main effects for ethnicity, F (3, 76) = 4.47, $p < .01$, and for gender of parent, F (3, 76) = 9.28, $p < .0001$. The one univariate ethnicity difference indicated that Chinese-American parents (M = 3.03) rated their own competence in art higher than Caucasian-American parents (M = 2.69), F (3, 76) = 4.01, $p < .05$. Closer

examination revealed that Chinese-American fathers (M = 2.78) rated their art competence significantly higher than did Caucasian-American fathers (M = 2.25), $F(1, 72) = 4.94$, $p < .05$, while the difference between Chinese-American mothers (M = 3.28) and Caucasian-American mothers (M = 3.13) was not significant.

All three univariate gender of parent differences were significant. Mothers liked art better (M = 4.14), indicated art was easier for them (M = 3.46), and reported higher competence in art (M = 3.20) than did fathers (Ms = 3.35, 2.76, 2.51), Fs (1,78) = 28.07, 15.68, 15.66, ps < .0001.

Combined parents' attitudes. Because the three parent attitude measures (liking of art, easiness of art, and art competence) were highly intercorrelated for both mothers and fathers, we collapsed them into an parent art attitudes measure. Two parent questions assessing the child's liking of drawing and the prediction of how easy it would be for their child to get good grades in art were highly correlated ($r = .89$) and were combined into one measure called parent child-specific attitudes.

A 2 (ethnicity) x 2 (sex of child) x 2 (age) MANOVA performed on parents' art attitudes, parents' child-specific art attitudes, parents' gender stereotypes about careers in art, and parents' views about the importance of competence in art for their child revealed significant main effects for ethnicity, $F(4, 68) = 5.02$, $p < .001$, and sex of child, $F(4, 68) = 4.15$, $p < .01$. Univariate ethnicity differences revealed that Chinese-American parents (M = 3.27) reported careers in art to be slightly more suitable for women, whereas the Caucasian-American parents (M = 3.05) were nearer the neutral point, $F(1, 71) = 8.34$,

$p < .01$. In addition, Chinese-American parents (M = 3.54) thought it was more important for their child to develop competence in art than did Caucasian-American parents (M = 3.13), $F(1, 71) = 9.31$, $p < .01$. Univariate sex of child results revealed that parents reported daughters (M = 4.18) will find it easier to get good grades in art and daughters like drawing better than do sons (M = 3.67), $F(1, 71) = 14.80$, $p < .0001$.

Personality characteristics. A MANOVA performed on the parents' ratings of the importance of fostering particular personality characteristics in their child showed a significant main effect for ethnicity, $F(14, 57) = 5.43$, $p < .0001$. (See Table 2.) Chinese-American parents' ratings (on a 5-point scale, with 1 representing "not important" and 5 representing "very important") of the importance of politeness, calmness, neatness, concentration, and precision were higher than ratings from Caucasian-American parents. On the other hand, the rating of independence by Caucasian-American parents was marginally significantly higher than Chinese-American parents.

Insert Table 2 about here

Two subscales were formed: Typical Chinese-American characteristics (Cronbach's alpha = .82) included persistence, obedience, politeness, calmness, neatness, concentration, precision, and respect;and typical Caucasian-American characteristics (Cronbach's alpha = .70) included self-confidence, curiosity, sociability, creativity, assertiveness, and independence. A MANOVA performed

on the Chinese-American and Caucasian-American personality scale sum totals revealed an ethnicity main effect, F (2, 70) = 10.98, $p < .0001$. Chinese-American parents (Sum = 68.62) rated Chinese personality characteristics as significantly more important than did Caucasian-American parents (Sum = 63.58), F (1, 71) = 13.86, $p < .0001$.

Parent Practices. A MANOVA performed on data from the time diaries and math facilitation techniques revealed main effects for age, F (5, 65) = 6.22, $p < .0001$, and ethnicity, F (5, 65) = 16.85, $p < .0001$. (Refer to Table 3.) Kindergarten children were awake more hours per day and spent more time doing homework than did preschoolers. Chinese-American children spent more time in concentrated homework or practice, less time watching television or videos, and more time in scheduled activities than did Caucasian-American children.

Insert Table 3 about here

The majority of Caucasian-American parents (82%) approved of rough-and-tumble play, whereas only 27% of Chinese-American parents did. Caucasian-American parents (M = 70.7%) desired a higher percentage of play in a preschool program than Chinese-American parents (M = 60.7%), t (37) = 3.04, $p < .01$.

Relationships between parent measures and child outcomes

To assess the relationships of parental factors to child outcomes, a series of forced entry hierarchical multiple regressions was performed using ethnicity, sex of child, ethnicity x sex of child interaction term, parents' art attitudes, parent

child-specific attitudes, Chinese personality scale, time on homework, and percentage of play preferred in the preschool curriculum as independent variables; and drawing, motor coordination (name writing and numeral writing), drawing creativity, visual discrimination, and puzzle solution time as dependent variables.

Ethnicity predicted drawing score, motor coodination, and puzzle time. Chinese-American children performed significantly better on all three measures. (See Table 4.) Sex of child also predicted drawing score. Girls produced more mature drawings than boys. The amount of time spent on homework predicted the drawing score and motor coordination, with children who spent more time on homework having more mature drawings and better fine muscle coordination. The Chinese personality scale predicted motor coordination and drawing creativity. Stronger parental endorsement of the Chinese personality characteristics was related to poorer motor coordination in the child, but higher creativity ratings.

Insert Table 4 about here

Parents' preference for play in the preschool curriculum was negatively correlated with motor coordination and positively correlated with puzzle time. Parents who preferred a greater percentage of play in preschool programs had children who were poorer at motor coordination and who took longer to solve the puzzle. Parent art attitudes predicted drawing creativity. Parents who liked art better, who had higher competence in art, and who found it easier to get good grades in art had children with higher creativity ratings. The interaction term, ethnicity x sex of child, predicted puzzle time. Among Caucasian-American

children, girls were slower than boys at solving the puzzle, whereas among Chinese-American children, girls were faster than boys at solving the puzzle.

Discussion

As predicted, second-generation young Chinese-American children are more advanced in their drawing and handwriting than Caucasian-American children. Contrary to our predictions, however, the drawings of Chinese-American children were rated as more creative. Chinese-American parents set aside much more time each day for the child to focus on fine muscle activities. During that time children would practice drawing, writing, math, and music (piano or violin). Parents or older siblings showed them how to draw and write their names and numerals. It appears for the short term, at least, that teaching drawing skills to children has not squelched their creativity, but rather has enabled them to be more creative. Howard Gardner (1989) commented, "I understand in my bones the need--and the desirability--for at least some basic skill training beginning relatively early in life, and feel that such regimens are all too often missing from the American educational and childrearing scene today" (pp. 217-218).

This phenomenon of more uniform higher performance among Chinese-American children also causes one to wonder what role maturation may play in the development of young children's fine motor control and whether that maturation varies by ethnicity. Because motor development is regulated to a large degree by maturation, it is possible that fine-motor control comes earlier to children of Chinese descent. It is also possible that the calmer temperament of Chinese infants (Freedman & Freedman, 1969; Kagan, Arcus, Snidman, Feng,

Hendler, & Greene, 1994) makes it easier for them to concentrate on formal instruction at an earlier age.

Chinese-American young children showed superior skill at drawing and writing tasks. In addition, their drawings were rated as more creative. These results challenge the widely-held belief that creativity is squelched by a more structured parental teaching approach.

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Table 1

Sample Demographics

	Chinese-American		Caucasian-American	
	Mean	S.D.	Mean	S.D.
Age of child	5.67	.34	5.60	.32
Number of children in family	2.21	.55	2.41	.71
Mother's age	37.38	2.88	36.88	4.40
Father's age	39.77	3.09	39.62	4.84
Mother's educational attainment	16.73	1.94	17.18	1.32
Father's educational attainment	18.23	2.21	17.68	1.81
Hollingshead status scores	59.83	6.81	60.77	4.63
Months in preschool program	22.15	13.67	23.75	13.05

Notes. No significant differences on any of the demographics.

Table 2
Ethnicity Differences in Ratings of Importance of Personality Characteristics

Personality Characteristic	Chinese-American Mean	Caucasian-American Mean	F
Chinese Scale			
Persistence	4.63	4.55	N.S.
Obedience	3.94	3.83	N.S.
Politeness	4.51	4.27	4.96*
Calmness	4.11	3.45	16.64***
Neatness	4.02	3.43	33.54***
Concentration	4.64	4.39	8.27**
Precision	3.92	3.56	4.78*
Respect	4.49	4.51	N.S.
American Scale			
Self-confidence	4.81	4.91	N.S.
Curiosity	4.50	4.59	N.S.
Sociability	4.22	4.29	N.S.
Creativity	4.59	4.51	N.S.
Assertiveness	4.14	3.95	N.S.
Independence	4.32	4.52	3.55†

Notes. A 5-point scale, with 1 representing "not important" and 5 representing "very important," was used to rate each personality characteristic.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Ethnicity Differences in Parents' Practices

Measure	Chinese-American		Caucasian-American		
	Mean	S.D.	Mean	S.D.	F
Child's daily scheduled time (hrs.)	7.89	1.70	6.30	1.56	12.03***
Child's daily time on homework/practice (min.)	55.56	43.41	5.92	13.16	47.75****
Child's daily time watching TV (hrs.)	1.35	0.86	1.87	1.01	5.55*

Notes. *$p < .05$. ***$p < .001$. ****$p < .0001$.

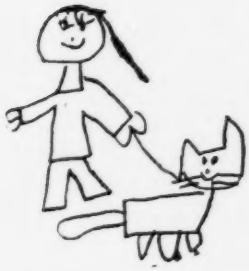
Table 4

Prediction of Child Drawing Outcomes from Ethnicity, Parent Attitudes, and Parent Practices

Child Outcome Measures	Predictors	R^2 Change	R^2	Beta
Draw-A-Person Score	Ethnicity	.16***	.16	-.33
	Sex of child	.05*	.21	-.33
	Time on homework	.04*	.27	.27
Motor Coordination	Ethnicity	.32****	.32	-.47
	Chinese personality scale	.02	.38	-.21
	Time on homework	.03*	.41	.26
	Preference for play-oriented preschool	.05**	.47	-.26
Drawing creativity	Parent art attitudes	.05*	.22	.24
	Chinese personality scale	.02	.26	.25
Puzzle time	Ethnicity	.07*	.07	.40
	Ethnicity x sex	.04	.11	-.48
	Preference for play oriented preschool	.05*	.20	.26
Visual discrimination score	No predictors			

Notes. Listed are those variables meeting a stepwise inclusion criterion of $p < .05$. Betas are from the final regression equation; R^2 change and R^2s are from the step at which the particular variable entered the equation. Chinese is coded 0; Caucasian is coded 1. Girl is coded 0; Boy is coded 1.
*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Chinese-American



Caucasian-American

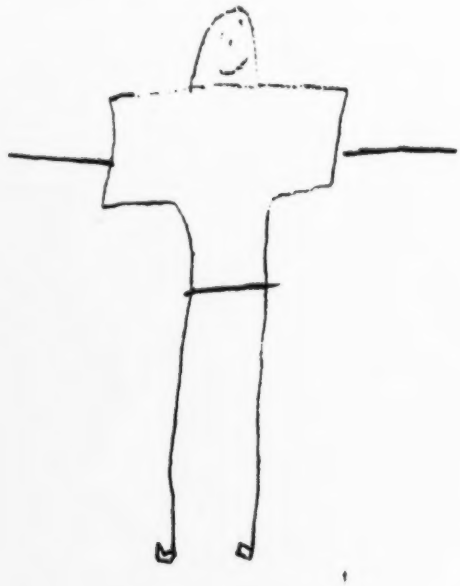


Figure 1. Drawings receiving the mean score on the Draw-A-Person Test in each ethnic group.

Chinese-American

Caucasian-American

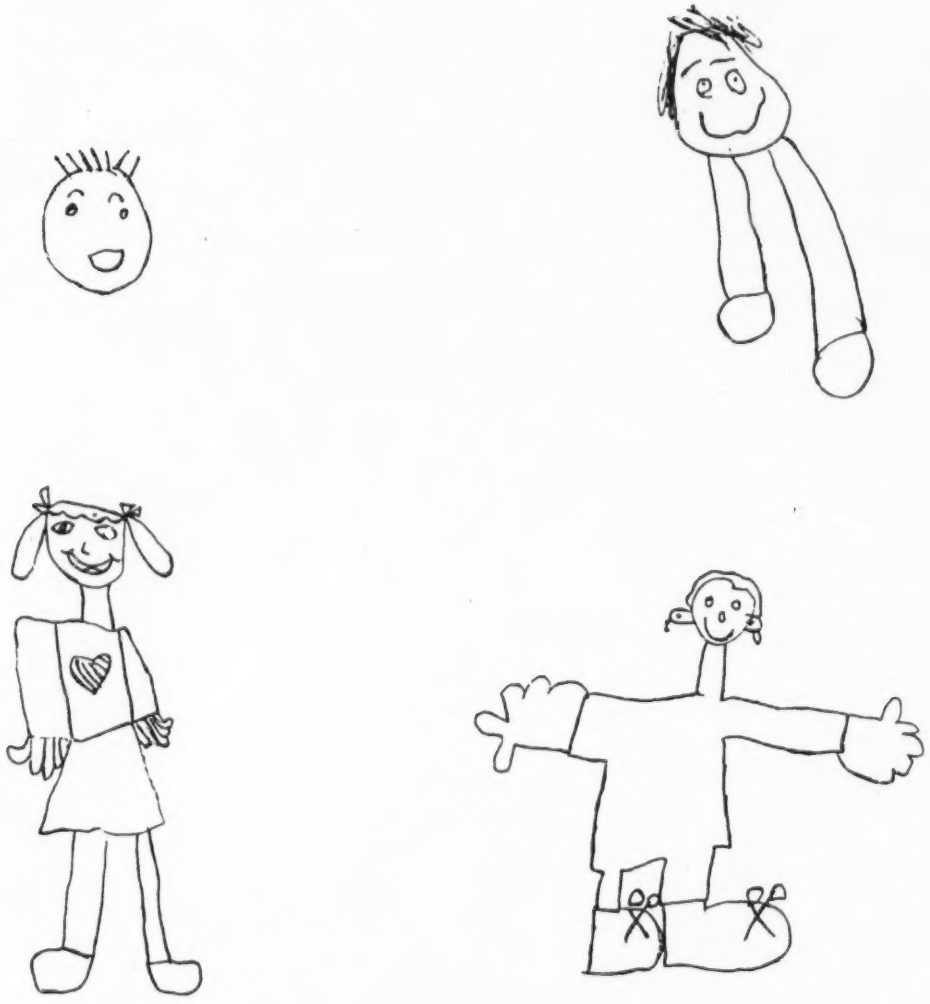


Figure 2. Drawings representing the range in each ethnic group.